JGN II and a Research Project on GMPLS at Tsukuba JGN II Research Center

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Tsukuba JGN II Research Center

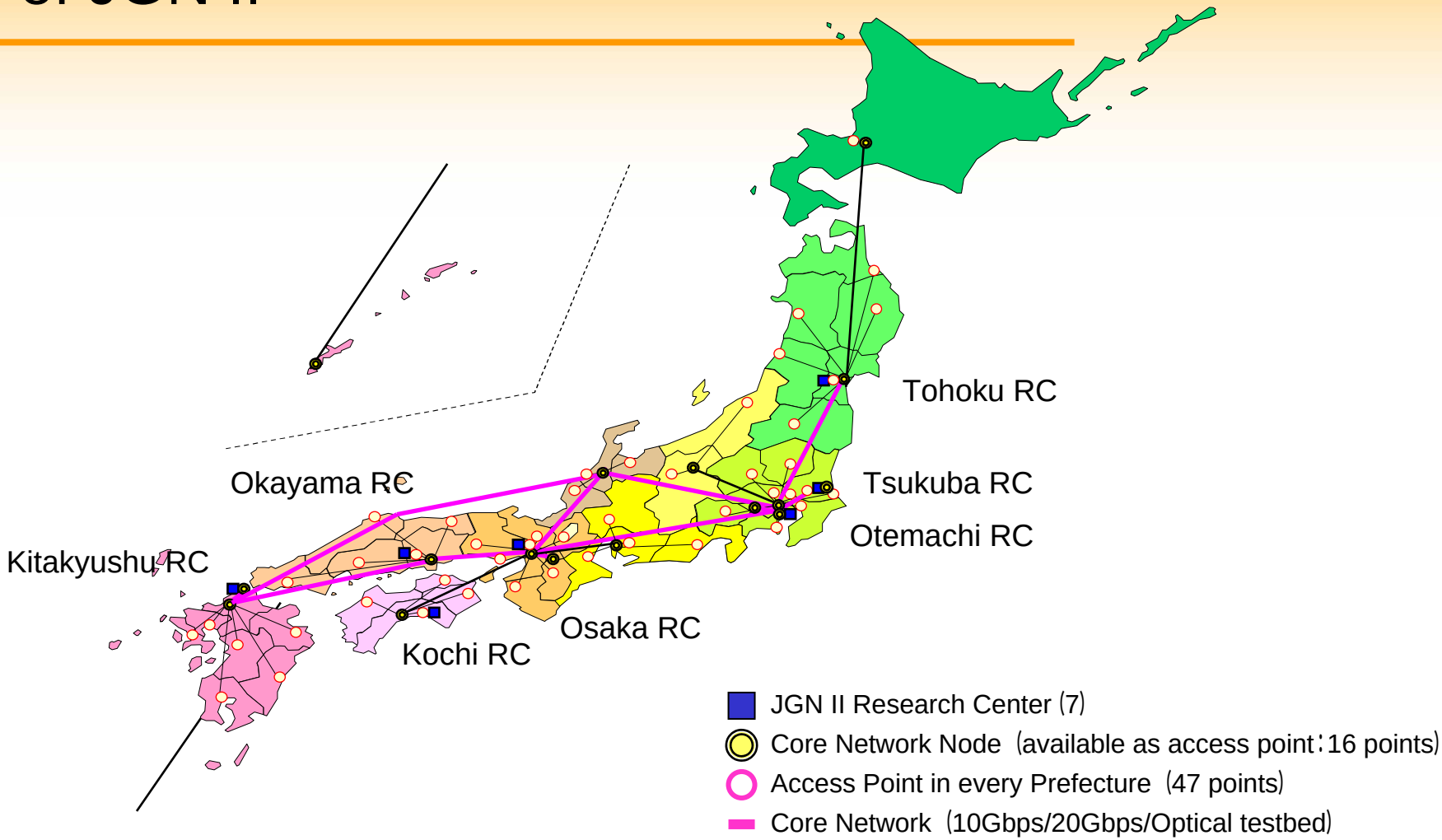
Outline

- About JGN II
- Tsukuba JGN II Research Center
- GMPLS Network Operation and Management Technology
- Concluding Remark

JGN II

- Established by NICT, operating since April 2004
- Open testbed for R&D through collaboration with universities, research institutions, and industries
- Nationwide IP network, optical wavelength network, optical testbed
- Max. 20 Gbps (100 Mbps, 1 Gbps, 10 Gbps, 20 Gbps)
- 63 access points (at least one in each prefecture)
- L2, L3 services, OXC connection, optical testbed
- JGN II/Japan – US Line (10 Gbps (OC-192))

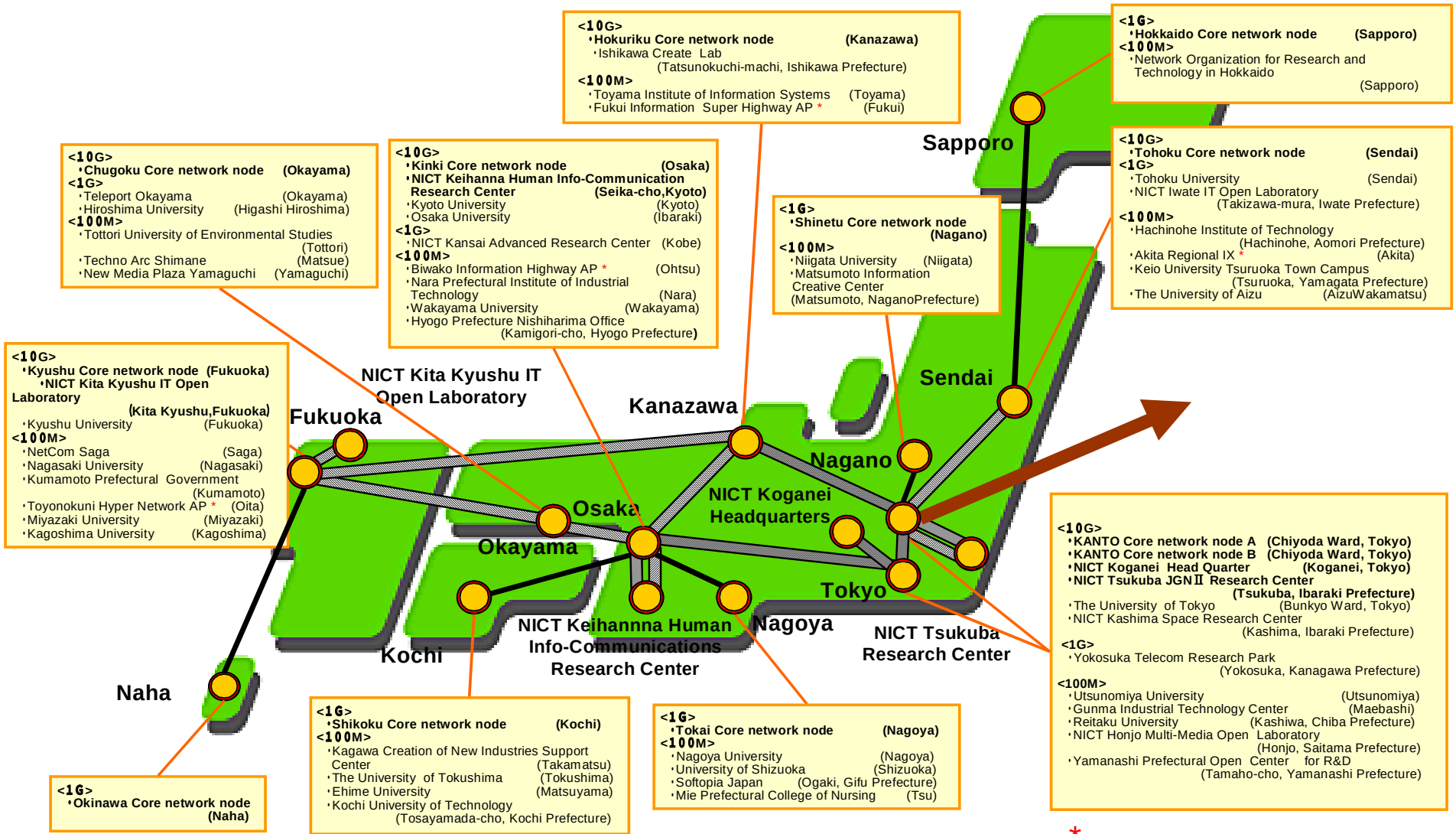
Network, Access Points, Research Centers of JGN II



(Edited from JGN II promotion materials of NICT)

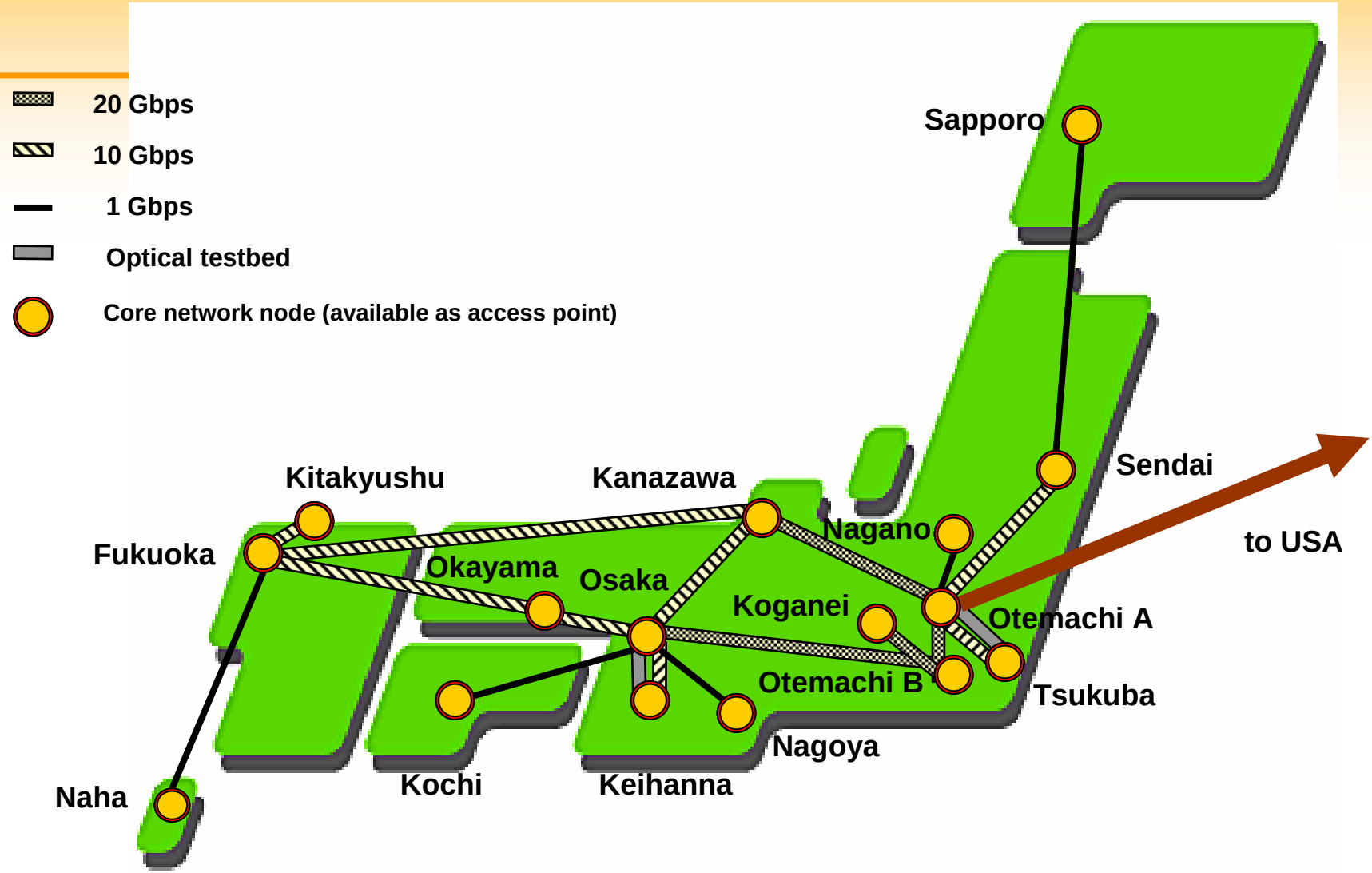
Access Points

(Edited from JGN II promotion materials of NICT)



*IX:Internet eXchange AP:Access Point

Core Network and Nodes of JGN II



(Edited from JGN II promotion materials of NICT)

Themes and Subjects of JGN II project

"Advanced Network and Application Technologies" Leader: Prof. Oie

I "Highly Reliable Core Network Technology" Sub-leader: Prof. Esaki

- network architecture operation support tools (Otemachi RC)
- wide-area, highly reliable network access provision technologies (Otemachi RC)
- methods and tools of testing and analyzing IPv6 equipment (Otemachi RC)
- interoperability verification for the next generation Internet (Okayama RC)
- GMPLS network operation and management technology (Tsukuba RC)

II "Access Network Technology" Sub-leader: Prof. Oie

- measurement-based adaptive routing technology (Kitakyushu RC)
- QoS-aware and seamless resource allocation/utilization technology (Kitakyushu RC)
- end-to-end communication control technology adaptive to diversity variability Kitakyushu RC)

III "Grid Technology" Sub-leader: Prof. Shimojo

- secure resource sharing technologies for base linkups (Osaka RC)
- large-scale data processing linkup technologies on wide-area networks (Osaka RC)

IV "Platform and Application Technology" Sub-leader: Prof. Sone

- application-oriented management platform technologies (Tohoku RC)
- surrounding computing technology (Kochi RC)
- adaptive service control utilizing advanced HCI* technology (Tsukuba RC)

*HCI:Human-Computer Interraction

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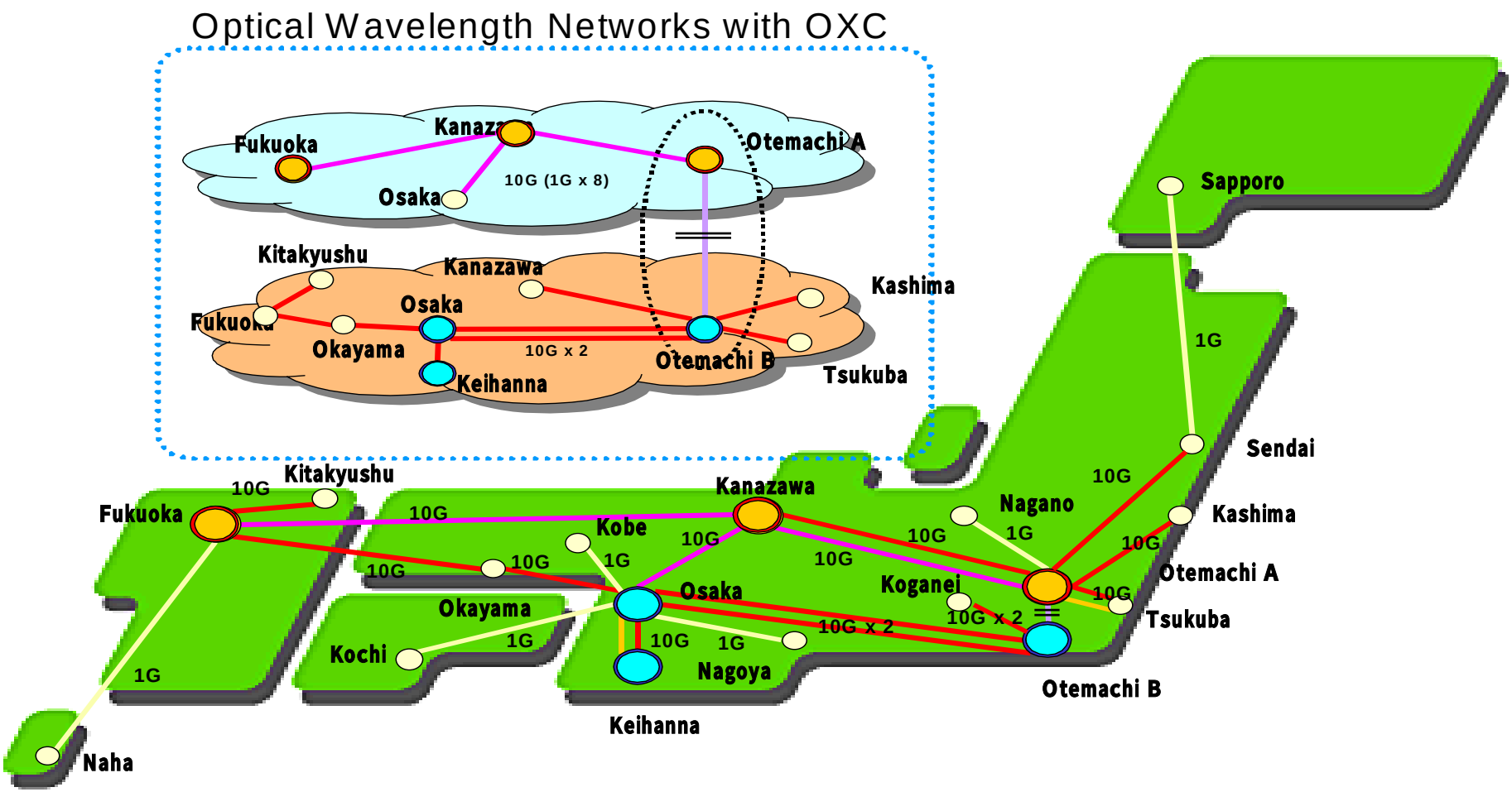
(Edited from JGN II promotion materials of NICT)

Tsukuba JGN II Research Center

Optical Wavelength Network with OXC suitable for GMPLS Research



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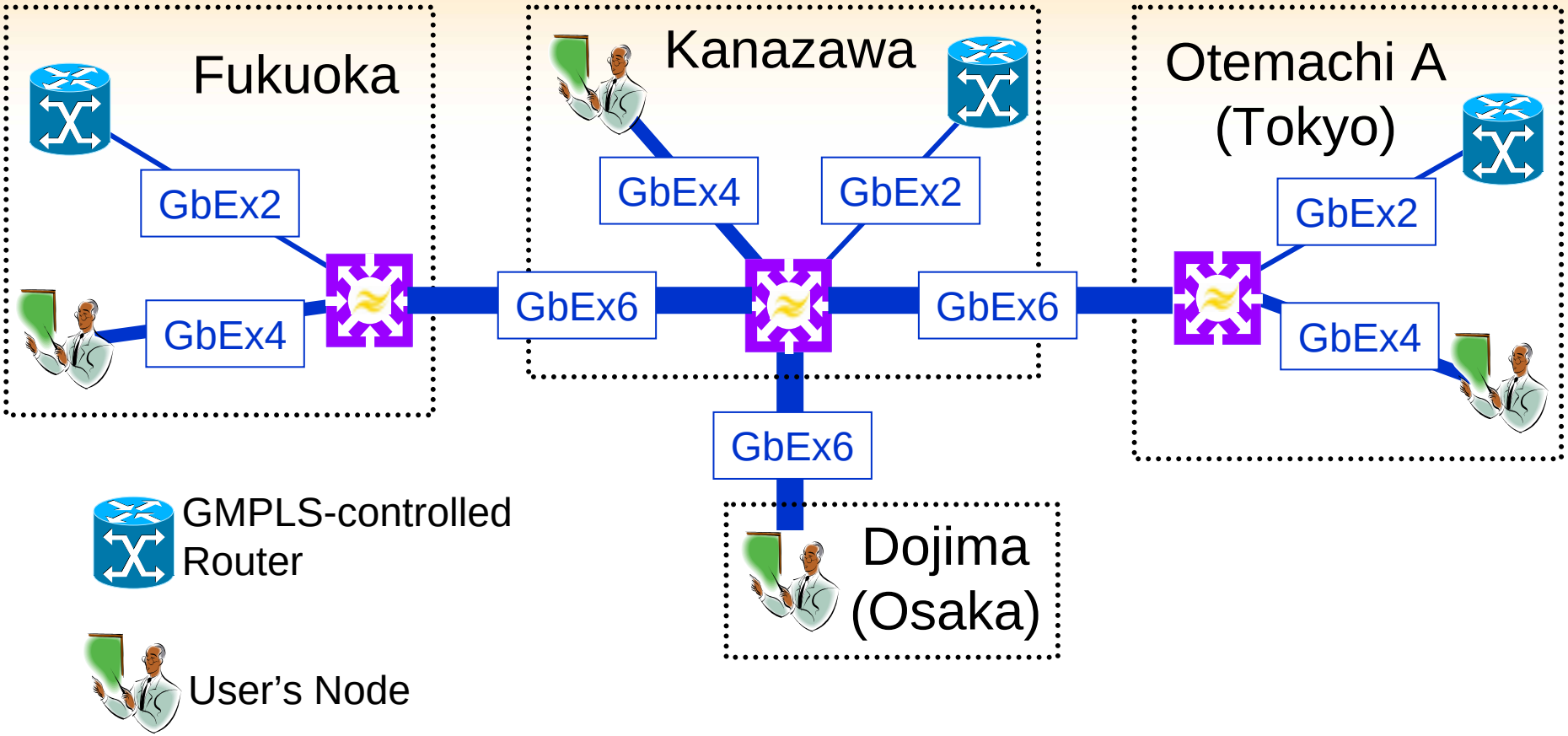
OXC path service on JGNII GMPLS network(1)



(Courtesy of Mr. S.Okamoto of Tsukuba RC)

GMPLS Network Operation and Management Technology

- Multi-layer management technology
  Lambda label switched path provisioning
  network management, control system

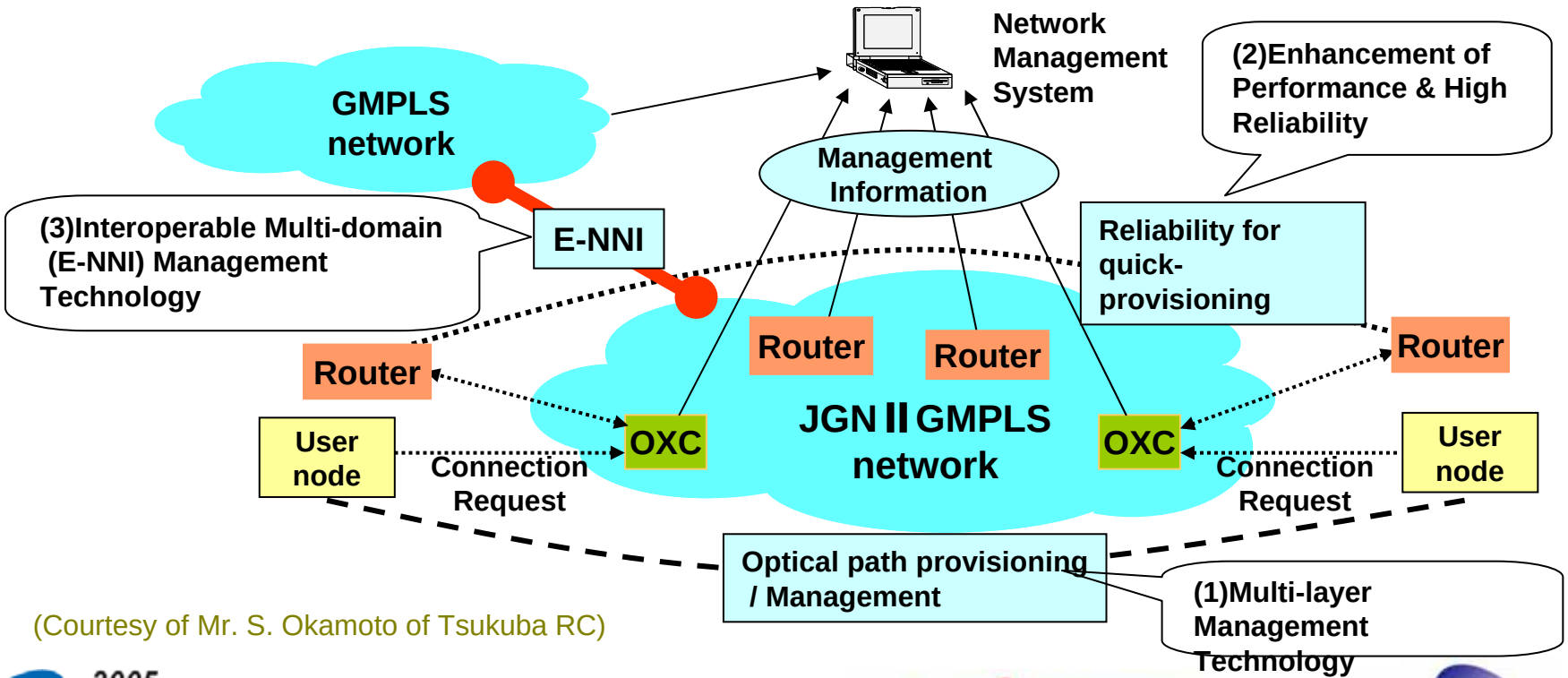
- Enhancement of performance and reliability of GMPLS Network
  Reliability of control plane → reliability of data-plane,
  interactive health monitoring

- Interoperable multi-domain (E-NNI) management technology
  interoperable between northern route and southern route

- Field experiments for efficient and reliable transmission of large volume of data from research activities of research institutions in Tsukuba Science City via Tsukuba WAN.

GMPLS Research at Tsukuba JGNII Research Center

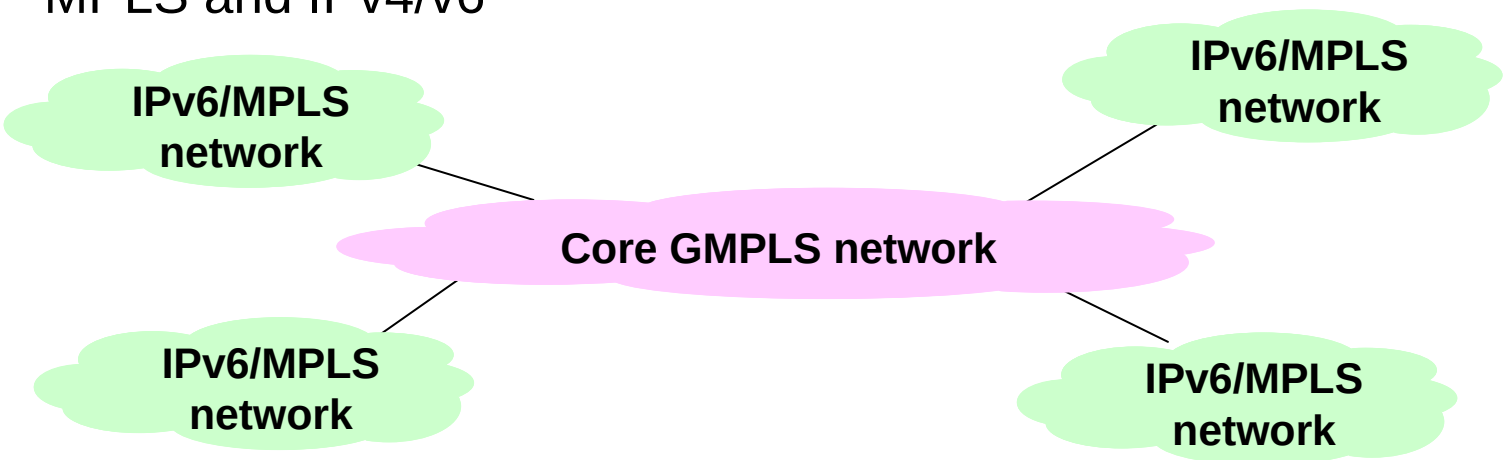
- Operation of GMPLS network
- R&D activities



(Courtesy of Mr. S. Okamoto of Tsukuba RC)

Multi-layer management technology (1)
- IPv6/MPLS transport over GMPLS network

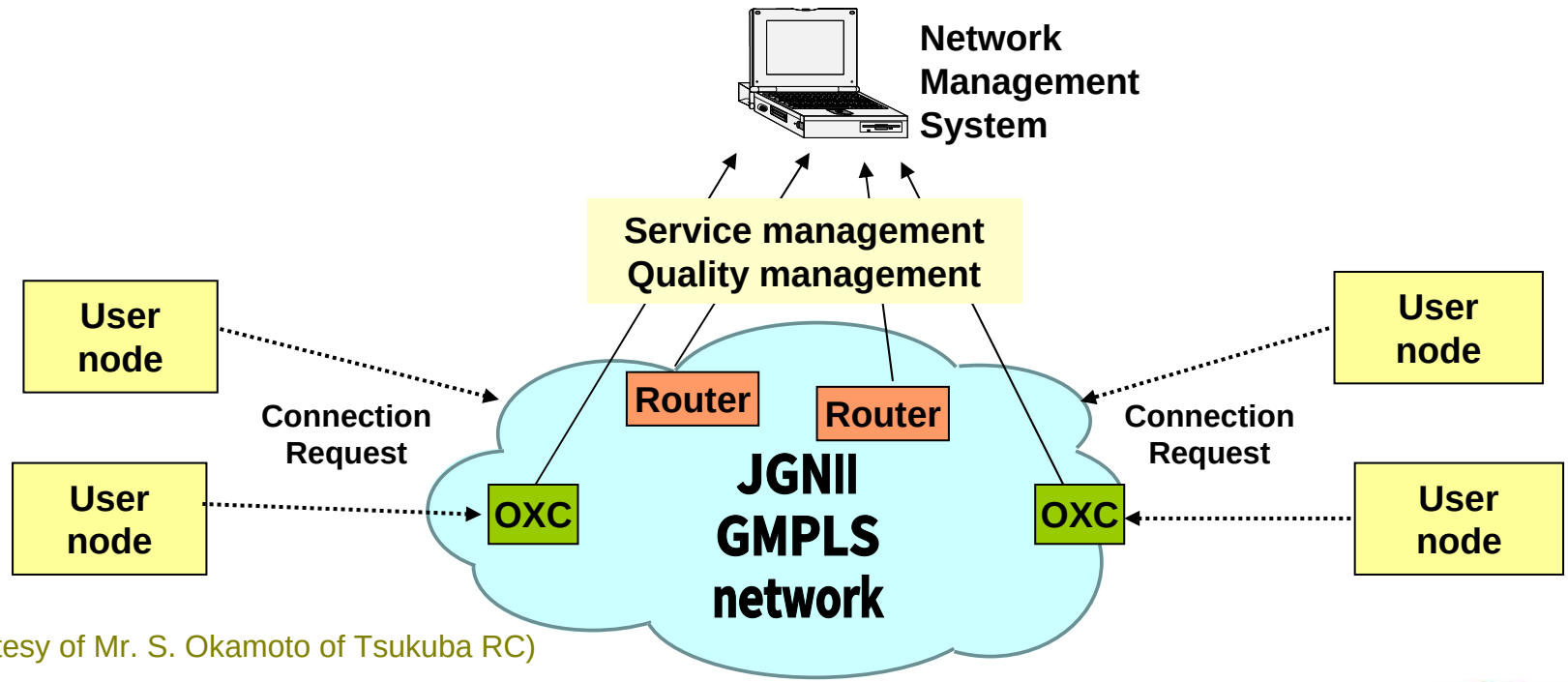
- Background
  - Next generation network model
    - Core: GMPLS network
    - Edge: IPv6/MPLS network
  - GMPLS-controlled optical network is expected to improve the efficiency of operation for providing higher layer services such as MPLS and IPv4/v6



(courtesy of Mr. S. Okamoto of Tsukuba RC)

Multi-layer management technology (2)

- User-oriented optical path provisioning



(courtesy of Mr. S. Okamoto of Tsukuba RC)

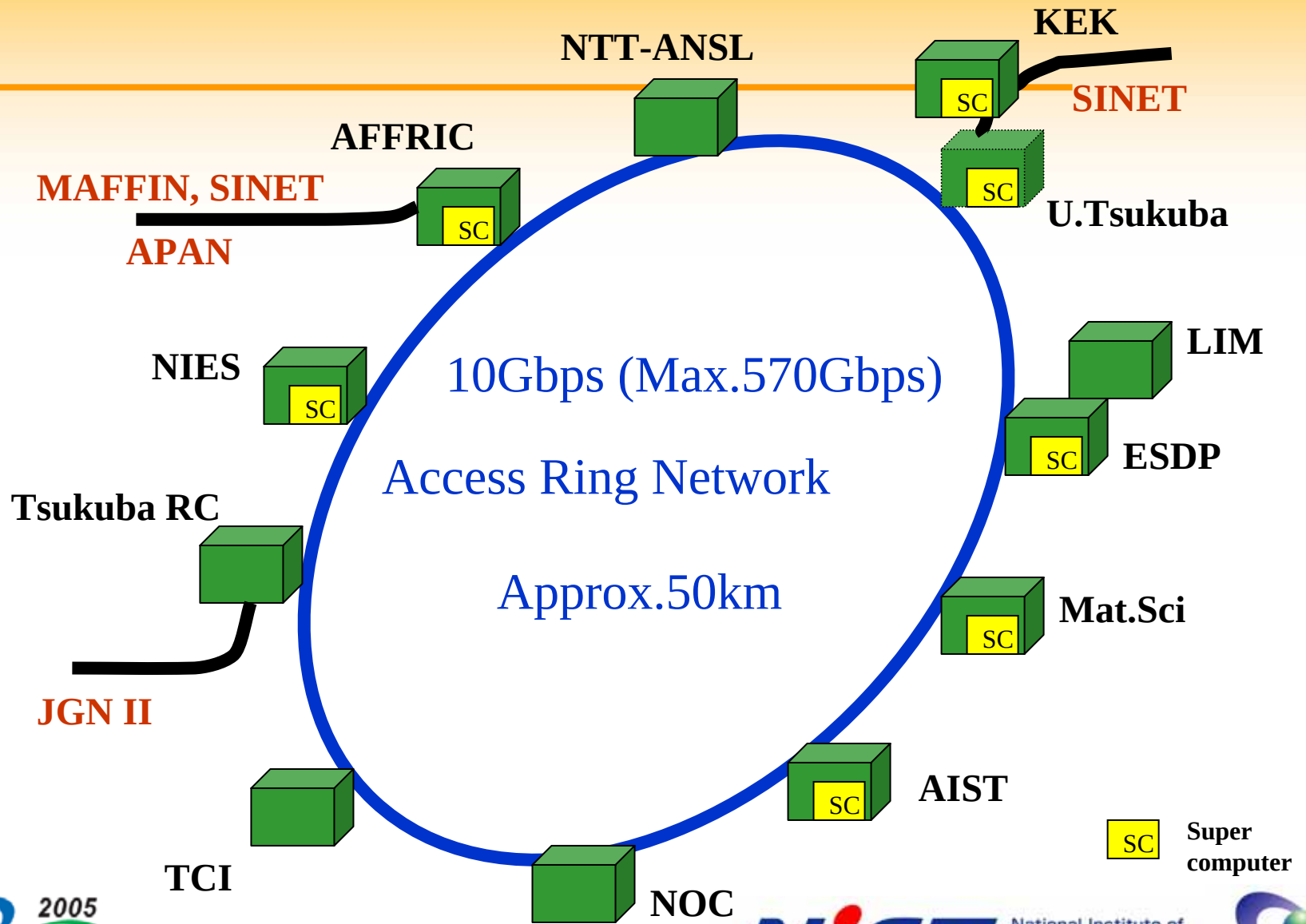
Tsukuba Science City and Tsukuba WAN

- Tsukuba Science City is located about 60 km northeast of Tokyo. There are about 200 research institutions including 34 national institutes. The populations is 190,000 including 13,000 researchers.

- Tsukuba WAN is a 50 km long access ring of 10 Gbps (max. 570 Gbps). Currently it links 11 institutes consisting of

  @University of Tsukuba, @Natl. Inst. Land and Infrastructure Management, @Natl. Inst. Earth Science and Disaster Prevention, @Natl. Inst. Materials Science, @Natl. Inst. Advanced Industrial Science and Technology, @Tsukuba Center for Institutes, @Tsukuba JGN II Research Center, @Natl. Inst. Environmental Studies, @Agriculture, Forestry and Fisheries Research Information Center, @High Energy Accelerator Research Organization (KEK), @NTT-Access Network Service Systems Laboratory

Tsukuba WAN


KEK
NTT-ANSL
SC
SINET
AFFRIC
SC
U.Tsukuba
MAFFIN, SINET
SC
APAN
LIM
NIES
SC
10Gbps (Max.570Gbps)
SC
ESDP
Access Ring Network
Tsukuba RC
Approx.50km
Mat.Sci
SC
JGN II
AIST
SC
SC
Super computer
TCI
NOC

Concluding Remark

- Brief account was given of JGN II
- Detailed exposition was given of research activities of Tsukuba JGN II Research Center shedding light on one of its core research subjects "GMPLS Network Operation and Management Technology"
- The JGN II project has the aim to contribute to the accomplishment of the goal of the national strategy to generate a new paradigm of u-Japan.

Thank you.